



A.D. 1872, 17th JULY. N° 2141.

S P E C I F I C A T I O N

OF

HENRY SYED COPLAND.

APPARATUS FOR MIXING AND
PRECIPITATING SEWAGE, &c.

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A.D. 1872, 17th JULY. N° 2141.

Apparatus for Mixing and Precipitating Sewage, &c.

LETTERS PATENT to Henry Syed Copland, of No. 1^A, Duke Street, Adelphi, in the County of Middlesex, Civil Engineer, for the Invention of "IMPROVED APPARATUS FOR MIXING PRECIPITATING MATERIALS WITH SEWAGE AND REMOVING DEPOSITS, WHICH APPARATUS IS APPLICABLE ALSO FOR OTHER PURPOSES."

Sealed the 11th January 1873, and dated the 17th July 1872.

PROVISIONAL SPECIFICATION left by the said Henry Syed Copland at the Office of the Commissioners of Patents, with his Petition, on the 17th July 1872.

I, HENRY SYED COPLAND, of No. 1^A, Duke Street, Adelphi, in the 5 County of Middlesex, Civil Engineer, do hereby declare the nature of the said Invention for "IMPROVED APPARATUS FOR MIXING PRECIPITATING MATERIALS WITH SEWAGE AND REMOVING DEPOSITS, WHICH APPARATUS IS APPLICABLE ALSO FOR OTHER PURPOSES," to be as follows:—

10 This Invention relates to an arrangement of apparatus adaptable either to circular, rectangular, or other tanks or reservoirs for effectually and uniformly mixing precipitating materials with sewage in such

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tanks or reservoirs and afterwards removing deposits from the same for further treatment.

The apparatus is applicable also for mixing other fluid or semi-fluid substances of unequal densities in tanks or reservoirs and removing portions of the contents of such tanks or reservoirs. 5

In arranging the apparatus for dealing with the contents of rectangular tanks or reservoirs I construct a tramway or track between two such tanks or reservoirs for the apparatus to travel on.

The apparatus consists of a travelling platform or carriage with arms at its sides overhanging the tanks or reservoirs and supporting shafts to 10 which are attached a number of radiating arms or agitators reaching close to the bottom of the tanks or reservoirs and having a continuous or rotary motion.

This motion may be given to the radiating arms by gearing from one or more of the axles of the travelling platform or carriage. The shafts 15 carrying the radiating arms or agitators may be placed vertically, horizontally, or obliquely to the direction of the tanks or reservoirs, and may by suitable gearing be made to revolve faster on their axes than would be due to the rate of progress of the travelling platform or carriage, and they may revolve in the same or in the reverse direction 20 to that of the movement of the travelling platform or carriage, or they may revolve in contrary directions to each other.

The travelling platform or carriage carries also a receptacle in which the precipitating or other materials to be added to those in the tanks or reservoirs are mixed with the necessary quantity of fluid and kept 25 at a uniform density by means of a suitable agitator, and in connection with this receptacle suitable perforated tubes or channels are provided for conducting the precipitating or other materials over the radiating arms or agitators and discharging such materials into the tanks or reservoirs. The travelling platform or carriage may also be provided 30 with suitable adjustable apparatus, which may be connected to it when required for the purpose of removing the whole or part of the deposit or contents from the tanks or reservoirs, by a slowly advancing motion of the travelling carriage or platform towards the outlet. Motion may be given to the apparatus by means of a rope fastened 35 at either end to the opposite ends of the travelling platform and passing over a pulley at a fixed anchorage at one end of the tramway, and

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around a barrel or drum driven by steam and with suitable reversing gear at the other end; but I do not confine myself to this method of giving motion to the apparatus.

The above arrangement may be modified for application to a single
5 tank or reservoir by laying one rail or track at either side of the tank or reservoir and arranging the platform and its mixing apparatus at the centre or at one end of the travelling apparatus.

In applying my Invention to a circular tank of large diameter in lieu of the overhanging arms a girder may be made to reach across the
10 tank and to travel at its respective ends upon a circular rail round a fixed axis, the submerged shafts and radiating arms or agitators being caused to rotate as before, and the precipitating or other materials being contained in a suitable vessel carried by and revolving with the travelling platform or carriage and provided with an agitator which may be fixed
15 on the fixed axis or made to revolve at a greater rate than the mixing vessel in the same or an opposite direction, as may be deemed most suitable for the particular case under treatment.

The distribution of the precipitating or other materials will be effected as before by perforated tubes or channels extending from the central
20 vessel with regulating valves to direct the rate of supply.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Henry Syed Copland in the Great Seal Patent Office on the 17th January 1873.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, HENRY
25 **SYED COPLAND**, of No. 1^A, Duke Street, Adelphi, in the County of Middlesex, Civil Engineer, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Seventeenth day of July, in the year of our Lord One thousand eight hundred and seventy-two, in the thirty-
30 sixth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Henry Syed Copland, Her special license that I, the said Henry Syed Copland, my executors, administrators, and assigns, or such others as I, the said Henry Syed Copland, my

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executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for “IMPROVED APPARATUS 5 FOR MIXING PRECIPITATING MATERIALS WITH SEWAGE AND REMOVING DEPOSITS, WHICH APPARATUS IS APPLICABLE ALSO FOR OTHER PURPOSES,” upon the condition (amongst others) that I, the said Henry Syed Copland, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain 10 the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Henry Syed Copland, do hereby 15 declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof (that is to say):—

This Invention relates to an arrangement of apparatus adaptable either to circular, rectangular, or other tanks or reservoirs for effectually 20 and uniformly mixing precipitating materials with sewage in such tanks or reservoirs and afterwards removing deposits from the same for further treatment.

The apparatus is applicable also for mixing other fluid or semi-fluid substances of unequal densities in tanks or reservoirs, and removing 25 portions of the contents of such tanks or reservoirs.

In arranging the apparatus for dealing with the contents of rectangular tanks or reservoirs I construct a tramway or track between two such tanks or reservoirs for the apparatus to travel on.

The apparatus consists of a travelling platform or carriage with arms 30 at its sides overhanging the tanks or reservoirs and supporting shafts, to which are attached a number of radiating arms or agitators reaching close to the bottom of the tanks or reservoirs and having a continuous or rotary motion.

This motion may be given to the radiating arms by gearing from one 35 or more of the axles of the travelling platform or carriage. The shafts

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carrying the radiating arms or agitators may be placed vertically, horizontally, or obliquely to the direction of the tanks or reservoirs, and may by suitable gearing be made to revolve faster on their axes than would be due to the rate of progress of the travelling platform or
5 carriage, and they may revolve in the same or in the reverse direction to that of the movement of the travelling platform or carriage, or they may revolve in contrary directions to each other.

The travelling platform or carriage carries also a receptacle in which the precipitating or other materials to be added to those in the tanks
10 or reservoirs are mixed with the necessary quantity of fluid, and kept at a uniform density by means of a suitable agitator, and in connexion with this receptacle suitable perforated tubes or channels are provided for conducting the precipitating or other materials over the radiating arms or agitators and discharging such materials into the tanks or
15 reservoirs. The travelling platform or carriage may also be provided with suitable adjustable apparatus which may be connected to it when required for the purpose of removing the whole or part of the deposit or contents from the tanks or reservoirs by a slowly advancing motion of the travelling carriage or platform towards the outlet. Motion may be
20 given to the apparatus by means of a rope fastened at either end to the opposite ends of the travelling platform, and passing over a pulley at a fixed anchorage at one end of the tramway, and around a barrel or drum driven by steam and with suitable reversing gear at the other end; but I do not confine myself to this method of giving motion to the
25 apparatus.

The above arrangement may be modified for application to a single tank or reservoir by laying one rail or track at either side of the tank or reservoir and arranging the platform and its mixing apparatus at the centre or at one end of the travelling apparatus.

30 In applying my Invention to a circular tank of large diameter in lieu of the overhanging arms a girder may be made to reach across the tank, and to travel at its respective ends upon a circular rail round a fixed axis, the submerged shafts and radiating arms or agitators being caused to rotate as before, and the precipitating or other materials being con-
35 tained in a suitable vessel carried by and revolving with the travelling platform or carriage, and provided with an agitator which may be fixed on the fixed axis or made to revolve at a greater rate than the mixing

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vessel in the same or an opposite direction, as may be deemed most suitable for the particular case under treatment.

The distribution of the precipitating or other materials will be effected, as before, by perforated tubes or channels extending from the central vessel with regulating valves to direct the rate of supply. 5

On Sheet 1 of the accompanying Drawings my improved apparatus is shewn as arranged for dealing with the contents of rectangular tanks or reservoirs, Fig. 1 representing the apparatus in side elevation as applied to a pair of rectangular tanks shewn in section.

Fig. 2, a plan of the apparatus, with parts of the tanks, tramway, and driving and reversing gear. 10

Fig. 3, a transverse section of the apparatus in the line A, B, of Fig. 2.

Fig. 4, a transverse section of the apparatus in the line C, D, of Fig. 2, with the anchorage and reversing gear in elevation. 15

Fig. 5, a central transverse section of the travelling carriage and lime mixer.

Fig. 6, an end elevation of the reversing gear to an enlarged scale.

And Fig. 7 is an enlargement of that part of Fig. 4 which shews the side elevation of the reversing gear. 20

The apparatus consists of a platform or carriage *a* travelling on rails or trams *b*, and constructed with arms *c* at its sides overhanging the tanks or reservoirs *d* and supporting shafts *e*, to which are attached a number of radiating arms or agitators *f* reaching close to the bottoms of the tanks or reservoirs, and having a continuous rotary motion. This motion is given to the radiating arms *f* by gearing *g*, *g*¹, from the axle *h* of the travelling platform or carriage, as shewn. The travelling platform or carriage *a* carries a receptacle *i* in which the precipitating or other materials to be added to those in the tanks or reservoirs are mixed with the necessary quantity of fluid, and kept at a uniform density by means of an agitator consisting of a vertical shaft *k*, actuated from the axle *h* by the gearing *l*, and passing through a suitable stuffing box in the bottom of the receptacle, radial arms *l*¹ being attached to the shaft, as shewn in Figs. 2 and 5. In connexion with the receptacle *i* perforated tubes *m* are provided for conducting the precipitating or other materials over the radiating arms or agitators *f*, and discharging such materials 25 30 35

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into the tanks or reservoirs d . For the purpose of removing the whole or part of the deposit or contents from the tanks or reservoirs by a slowly advancing motion of the travelling carriage or platform towards the outlet, I draw the bevil wheels of the axle h out of gear with the
 5 wheels g^1 , and to the arms f I temporarily secure a strip of wood or iron about the same length as the width of the tank. This strip of wood or iron carries a stiff strip or flap of india-rubber or leather, or such like material, or a row of suitable bristles extending to the bottom of the tank so as to sweep forward the deposit as the carriage travels
 10 towards the outlet end of the tank, from whence the deposit can be removed for further treatment by gravitation, pumping, or other well-known means.

Motion is given to the apparatus by means of a rope n kept tight by adjusting screws n^1 , and fastened at each end to the respective ends of
 15 the travelling platform. This rope passes over a pulley o at a fixed anchorage at one end of the tramway, and round a clip pulley p at the other end. The two fast pulleys q, q^1 , are keyed on to the shaft r , and the two loose pullies s, s^1 , are capable of turning freely on the said shaft. The driving belt t passes direct over a pulley u on the shaft v , which
 20 receives motion from a suitable engine in the ordinary way. The driving belt t^1 is crossed on its way to the pulley u^1 on the shaft v .

By this arrangement when the belt t is on the pulley q it will drive the shaft r in the same direction as the shaft v is moving in; but when the belt t^1 is on the pulley q^1 it will drive the shaft r in the contrary
 25 direction; w is a sector lever having its fulcrum at w^1 ; it is formed with teeth which gear into the teeth of a pinion x . This pinion is formed with an internal screw, and fits freely on a correspondingly screwed rod or bar y provided at each end with a fork, as shewn at y^1, y^2 . z is a lever forked at each end, and having its fulcrum at z^1 , so that
 30 the upper part of the rope n passes between the upper prongs at z^2 , and the under part of the rope through the lower prongs at z^3 . The lever z is connected by a rod l to the lower arm of the sector lever w .

In the position of the parts, as shewn in Figs. 2 and 4, the travelling
 35 carriage has just reached the farther end of the tank, and the knot n^2 on the rope n has moved the lower forked end z^3 of the lever z towards the sector lever w , thereby turning the sector lever and pinion x , and by the screw in the latter moving the screwed bar y so as to shift the

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belt t on to the loose pulley s and the belt t^1 on to the fast pulley q^1 in readiness for the return travel of the carriage which is now about to commence. As the carriage approaches the driving end of the tank the knot n^3 of the rope n will carry with it the upper end z^2 of the lever z , thereby throwing over the sector lever w , pinion x , and bar y , so as to 5 shift the belt t on to the fast pulley q and the belt t^1 on to the loose pulley s^1 for the return travel, and so on.

On Sheet 2 of the accompanying Drawings my Invention is represented as applied to a circular tank. The apparatus in this case is constructed with a square shaft 2 made to reach across the tank d and 10 to travel at its respective ends upon a circular rail b round the shaft 3, the submerged shafts e and radiating arms or agitators f being caused to rotate by bevil gearing g, g^1 , from the shaft 3, as shewn.

The precipitating or other materials are contained in the vessel i , carried by girders 4, partly supported by the central shaft 3, and pro- 15 vided with an agitator which is fixed on and revolves with the said shaft 3.

The distribution of the precipitating or other materials is effected by the perforated tubes m extending from the central vessel i , and provided with regulating valves to direct the rate of supply. 20

The shaft 3 may be actuated by a clip pulley and an endless rope, or in any other convenient way.

Circular tanks with apparatus as described may be advantageously arranged in sets for dealing with large quantities of material.

Having described my said Invention of "Improved Apparatus for 25 Mixing Precipitating Materials with Sewage and Removing Deposits, which Apparatus is applicable also for other Purposes," and having explained the manner of carrying the same into practical effect, I wish it to be understood that I do not claim as of my Invention or the exclusive use of the several mechanical parts herein-before described and referred 30 to, except when the same are used in and for the purposes of my said Invention, as respects which I claim,—

First. The construction and arrangement of travelling apparatus for mixing and precipitating purposes, substantially as herein-before described and illustrated on Sheet 1 of the accompanying Drawings. 35

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Secondly. The combination with the travelling carriage of the arrangement for actuating and reversing its direction of motion, substantially as shewn in and described with reference to Figs. 2, 4, 6, and 7 of the accompanying Drawings.

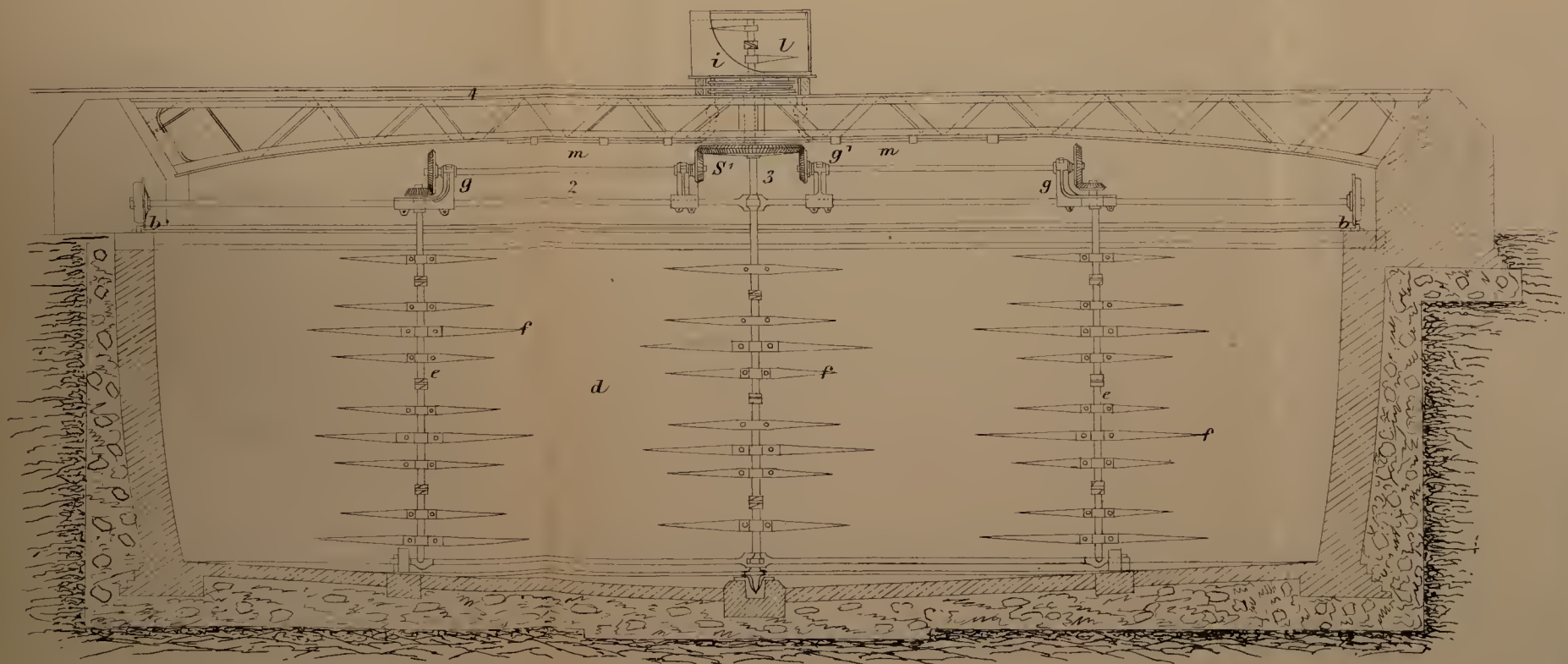
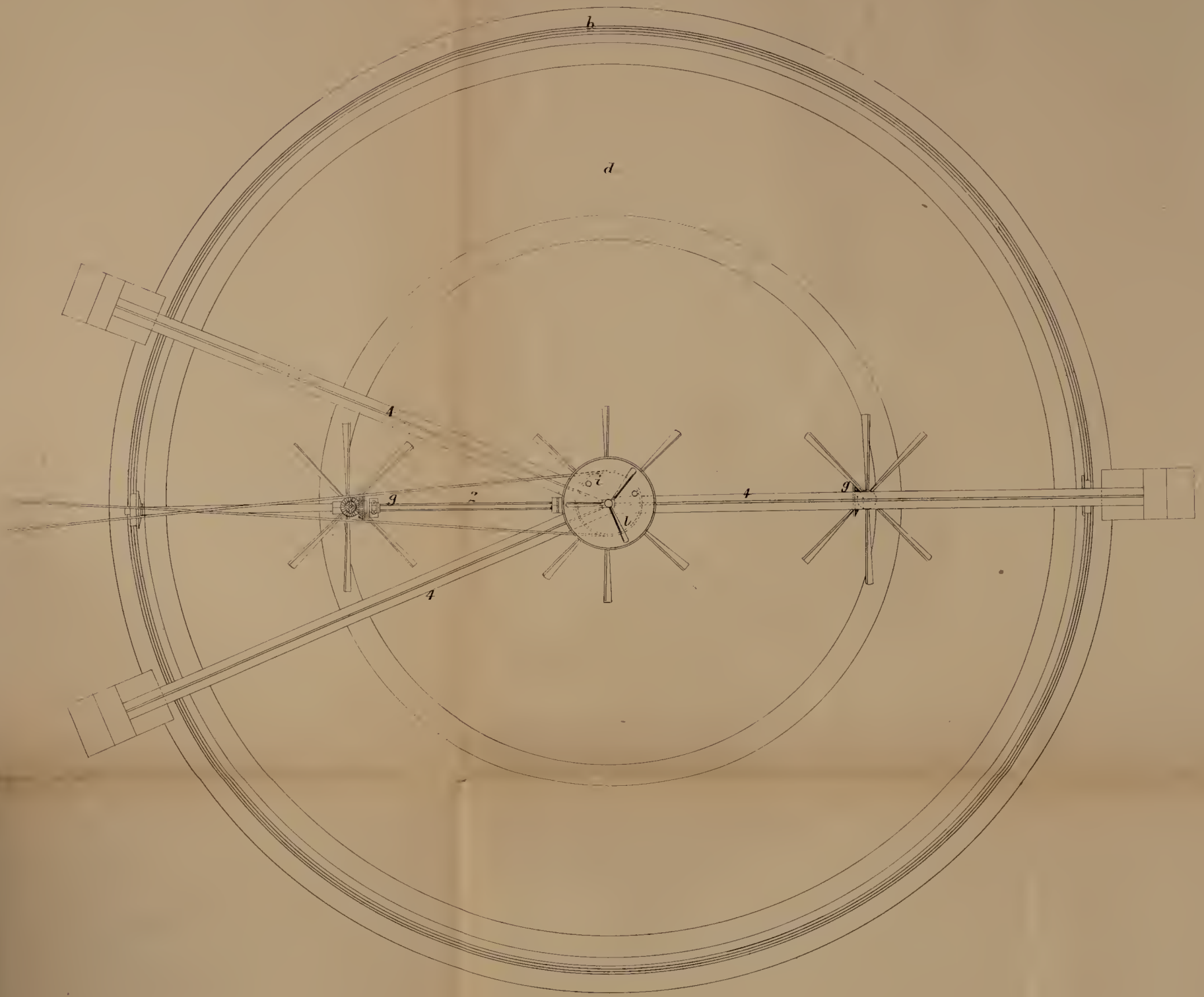
- 5 Thirdly. The construction and arrangement of mixing and precipitating apparatus, substantially as shewn on and described with reference to Sheet 2 of the accompanying Drawings.

10 In witness whereof, I, the said Henry Syed Copland, have here unto set my hand and seal, this Seventeenth day of January, in the year of our Lord One thousand eight hundred and seventy-three.

HENRY S. COPLAND. (L.S.)

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The filed drawing is partly colored.

Drawn on Stone by Malby & Sons

